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15. (New) A PSSA-PVDF membrane comprising a catalyst ink, wherein the catalyst ink comprises a catalytic material and poly(vinylidene fluoride).

#### REMARKS

Claims 1-5 and 11-15 are pending in this application. Claims 6-10 are canceled herein. New claims 11-15 are added. Basis for the new claims can be found in the application as originally filed. No new matter is added.

#### **THE REJECTION OF CLAIMS 1-5 UNDER 35 U.S.C. §112, FIRST PARAGRAPH**

The Office Action alleges that claims 1-5 are rejected for lack of enablement. It is alleged that a "solution" of catalytic material recited in claim 1 is not enabled in the specification. It is alleged that the catalytic material is not disclosed as soluble.

Applicant respectfully submits that amended claims 1-5 do not recite "solution" of catalytic material. Reconsideration and removal of the rejection is requested.

#### **THE REJECTION OF CLAIMS 1 AND 2 UNDER 35 U.S.C. §102(e)**

The Office Action alleges that claims 1 and 2 are anticipated by Cabasso *et al.* (U.S. Patent No. 5,992,008). The Office Action alleges that the reference teaches a catalytic ink substantially mixed into the poly(vinylidene fluoride) colloidal solution, i.e. as a suspension, with ultrasonication. Applicant respectfully submits that as discussed below, amended claims 1 and 2 are not anticipated by the disclosure of Cabasso *et al.*

#### **RELEVANT LAW**

Anticipation requires the disclosure in a single prior art reference of each element of the claim under consideration. *In re Spada*, 15 USPQ2d 1655 (Fed. Cir., 1990), *In re Bond*, 15 USPQ 1566 (Fed. Cir. 1990), *Soundscriber Corp. v. U.S.*, 360 F.2d 954, 148 USPQ 298, 301, adopted 149 USPQ 640 (Ct. Cl.) 1966. See, also, *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir., 1989), *cert. denied*, 110 S.Ct. 154 (1989). "[A]ll limitations in the claims must be found in the reference, since the claims measure the invention". *In re Lang*, 644 F.2d 856, 862, 209 USPQ 288, 293 (CCPA 1981). Moreover it is incumbent on the Examiner to identify wherein each and every facet of the claimed invention is disclosed in the reference. *Lindemann Maschinen-fabrik GmbH v. American Hoist and Derrick Co.*, 730 F.2d

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1452, 221 USPQ 481 (Fed. Cir. 1984). Further, the reference must describe the invention as claimed sufficiently to have placed a person of ordinary skill in the art in possession of the invention. An inherent property has to flow naturally from what is taught in a reference *In re Oelrich*, 666 F.2d 578, 581, 212 USPQ 323, 326 (CCPA 1981). "Rejections under 35 U.S.C. §102 are proper only when the claimed subject matter is identically disclosed or described in the 'prior art'. . . the [r]eference must clearly and unequivocally disclose the claimed compound or direct those skilled in the art to the compound without *any* need for picking, choosing, and combining various disclosures not directly related to each other by the teachings of the cited reference. Such picking and choosing may be entirely proper when making a rejection of a 103, obviousness rejection, where the applicant must be afforded an opportunity to rebut with objective evidence any inference of obviousness which may arise from the *similarity* of the subject matter which he claims to the prior art but it has no place in the making of a 102, anticipation rejection." (emphasis original). *In re Arkey, Eardly, and Long*, 455 F.2d 586, 172 USPQ 524 (CCPA 1972).

#### Claims 1 and 2

Amended claim 1 recites:

A composition comprising a catalyst ink and a PSSA-PVDF membrane, wherein the catalyst ink comprises a catalytic material and poly(vinylidene fluoride).

Claim 2 depends from claim 1 and further defines the catalytic material in the catalyst ink as Pt.

#### Disclosure of Cabasso et al.

The cited reference by Cabasso et al. discloses gas diffusion electrodes for fuel cells prepared by wet and dry phase inversion techniques. The reference discloses a catalytic blend of poly(vinylidene fluoride), and carbon black for preparing the gas diffusion electrodes using wet phase inversion technique. The reference discloses that the catalytic blend can further contain N,N-dimethyl formamide. It further discloses that the gas diffusion electrode is prepared by casting the blend with a doctor's knife onto a carbon substrate to form a film and coagulating the film in a coagulation liquid. The reference discloses in examples 1 and 4, a catalytic blend

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containing carbon black PVF and DMF used to cast a film which is then coagulated and dried to make a gas diffusion electrode. It is described in Example 1 that the electrode is painted with a catalyst layer ink containing polyvinylidene fluoride, propanol, water and Pt on Vulcan VX-72. Example 2 describes a catalytic blend containing Acetylene Black C-100 carbon, DMF and PVF. Example 3 describes a gas diffusion electrode made by casting a film of catalytic blend containing Pt on activated charcoal, DMF and PVF. Example 5 describes that the coagulated film is cast with a layer of ink containing Pt on Vulcan VX-72, DMF and polysulfone. Example 6 describes a gas diffusion electrode made by a process similar to Example 3 and further discloses poly(vinylpyrrolidone) as a pore filter to control the porosity of the gas diffusion layer. Example 7 describes preparation of two gas diffusion electrodes by the process of Example 1, using two different coagulation liquids.

**Differences between claims 1 and 2 and the disclosure of Cabasso et al.**

Cabasso et al. does not disclose a composition containing a catalyst ink and a PSSA-PVDF membrane, wherein the catalyst ink contains a catalytic material and poly(vinylidene fluoride) as claimed in claim 1. The reference discloses a catalytic blend of poly(vinylidene fluoride), and carbon black for preparing the gas diffusion electrodes. It discloses suitable substrates for catalytic blend as carbon substrates including carbon paper, carbon cloth, carbon felt and carbon tape. It is further disclosed that a catalyst ink is applied onto the gas diffusion electrode. The ink contains polyvinylidene fluoride, propanol, water and Pt on Vulcan VX-72. Thus, Cabasso et al. does not disclose every element of the claimed composition. Therefore, the reference does not anticipate the composition containing a catalyst ink and a PSSA-PVDF membrane, wherein the catalyst ink contains a catalytic material and poly(vinylidene fluoride) as claimed in claim 1.

Because claim 2 depends from claim 1, Cabasso et al. does not anticipate claim 2.

**THE REJECTION OF CLAIMS 1-5 UNDER 35 U.S.C. §102(e)**

The Office Action alleges that claims 1-5 are anticipated by Narayanan et al. (U.S. Patent No. 5,945,231). The Office Action alleges that the reference teaches a Pt:Ru catalytic material

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as a mixture with poly(vinylidene fluoride). Applicant respectfully submits that as discussed below, amended claims 1-5 are not anticipated by the disclosure of Narayanan *et al.*

#### RELEVANT LAW

As discussed above.

#### Claims 1-5

Claims 1 and 2 are as discussed above. Claims 3-5 depend from claim 1 and further describe the composition of claim 1.

#### Disclosure of Narayanan *et al.*

The cited reference by Narayanan *et al.* discloses a catalyst decal containing a selected catalyst material, perfluorovinylether sulfonic acid and polytetrafluoroethylene. The reference discloses that the decal can contain PVDF. The reference further discloses that the decal is prepared by mixing a catalyst material, perfluorovinylether sulfonic acid and polytetrafluoroethylene and coating a substrate, such as a Teflon substrate or carbon fiber sheet, with the mix. The reference discloses that the decal is transferred to polymer electrolyte membrane. The reference describes various steps involved in the preparation of decal and transfer of decal to a membrane. The reference does not disclose that the membrane can be a PSSA-PVDF membrane.

#### Differences between claims 1-5 and the disclosure of Narayanan *et al.*

Narayanan *et al.* does not disclose a composition containing a catalyst ink and a PSSA-PVDF membrane, wherein the catalyst ink contains a catalytic material and poly(vinylidene fluoride) as claimed in claim 1. As discussed above, the reference discloses a catalytic mix containing a catalyst material, perfluorovinylether sulfonic acid and polytetrafluoroethylene. The reference does not disclose a composition containing a catalyst ink and a PSSA-PVDF membrane, wherein the catalyst ink contains a catalytic material and poly(vinylidene fluoride). Therefore, the reference does not anticipate the composition as claimed in claim 1.

Because claims 2-5 depend from claim 1, Narayanan *et al.* does not anticipate any of the claims 2-5.

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**REJECTION OF CLAIMS 1-5 UNDER 35 U.S.C. §103(a)**

The Office Action rejects claims 1-5 as being obvious over Denton *et al.*, in view of Cabasso *et al.* as applied to claims 1 and 2 and as evidenced by Dupont™ Nafion® PFSA Polymer Dispersions product information guide. The Office Action alleges that Denton *et al.* teaches a catalyst ink for a fuel cell containing a catalytic material such as Pt. It is further alleged that the ink contains Nafion based ionomer. The Office Action further alleges that the reference teaches that both Pt and Ru are part of preferred group of metals. The Office Action concludes that it would have been obvious to one of ordinary skill in the art to employ both Pt and Ru as claimed in claim 3 because the reference teaches that one or more of these metals may be used.

The Official Action further alleges that it would have been obvious to one of ordinary skill in the art to make the catalyst ink of claim 1 over Denton *et al.*, which teaches a catalyst ink with PTEF polymers, in view of Cabasso *et al.*, which teaches poly(vinylidene fluoride) in catalyst ink, such a copolymer in the catalyst ink. Applicant respectfully traverses the rejection with respect amended claims 1-5.

**Relevant Law**

In order to set forth a *prima facie* case of obviousness under 35 U.S.C. §103: (1) there must be some teaching, suggestion or incentive supporting the combination of cited references to produce the claimed invention (*ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 USPQ 329, 933 (Fed. Cir. 1984)) and (2) the combination of the cited references must actually teach or suggest the claimed invention. Further, that which is within the capabilities of one skilled in the art is not synonymous with that which is obvious. *Ex parte Gerlach*, 212 USPQ 471 (Bd. APP. 1980). Obviousness is tested by "what the combined teachings of the references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981), but it cannot be established by combining the teachings of the prior art to produce the claimed subject matter, absent some teaching or suggestion supporting the combination (*ACS Hosp. Systems, Inc. v Montefiore Hosp.* 732 F.2d 1572, 1577, 221 USPQ 329, 933 (Fed. Cir. 1984)). "To imbue one of ordinary skill in

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the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher" *W.L. Gore & Associates, Inc. v. Garlock Inc.*, 721 F.2d 1540; 1553, 220 USPQ 303, 312-13 (Fed. Cir. 1983).

**The instant claims**

As discussed above.

**Teachings of Denton et al.**

Denton et al. teaches a catalyst component containing one or more metals including Pt and Ru and PTFE. The reference teaches the catalyst component is pressed into non-woven carbon fibre structure to form an electrode.

**Teachings of Cabasso et al.**

As discussed above.

**ANALYSIS**

The instant claims are not *prima facie* obvious over Denton et al. in view of Cabasso et al. for the following reasons.

**The combination of teachings of Denton et al. with the teachings of Cabasso et al. does not result in the instantly claimed composition.**

As discussed above, Denton et al. teaches a catalyst component containing one or more metals including Pt and Ru and PTFE that can be applied non-woven carbon fibre structure to form a gas diffusion electrode. It does not teach or suggest the composition of claim 1 containing a catalyst ink and a PSSA-PVDF membrane, wherein the catalyst ink contains a catalytic material and poly(vinylidene fluoride). Denton et al. further does not teach or suggest the compositions of claim 2-4, which depend from claim 1.

Cabasso et al. does not cure this defect. As discussed above, Cabasso et al. teaches a catalytic blend of poly(vinylidene fluoride), and carbon black for preparing the gas diffusion electrodes. It does not teach or suggest a composition containing a catalyst ink and a PSSA-PVDF membrane.

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Hence, Denton *et al.* does not teach the compositions of amended claims 1-5. Thus, the combination of the teachings of Denton *et al.* and Cabasso *et al.* does not result in the instantly claimed subject matter, which includes a composition containing a catalyst ink and a PSSA-PVDF membrane. Therefore, the claims are not *prima facie* obvious.

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In view of the amendments and remarks herein, reconsideration and allowance of the application are respectfully requested.

Applicant hereby petitions under 37 C.F.R. §1.136 for two (2) months extension of time. The Commissioner is hereby authorized to charge \$210.00, apply any other charges, or any credits, to Deposit Account 06-1050.

Respectfully submitted,

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